

and voluntary observers of the Weather Bureau, is shown on Chart VI.

Monthly snowfall of 1 inch, or more, was reported as follows, and in states and territories where the maximum depth was below that amount the station reporting the greatest is given:

California.—Summit, 3.5. *Colorado*.—Rico, 20.1; Sunnyside, 7.5; Lavender, 5.5; Pagoda (near) and Ward District, 4; Montrose, 3.5; Steamboat Spring and Climax, 3; Breckenridge, 2. *Idaho*.—Bonanza City, 5; American Falls, 4; Lake, 3; Idaho Falls and Martin, 1. *Michigan*.—Boon and Marquette, trace. *Minnesota*.—Saint Vincent, 1. *Montana*.—Virginia City, 13; Helena, 2.1; Elk Park, 1.3. *Nevada*.—Stofiel, 3.5; Belmont, 3.4. *New Mexico*.—Chama, 1.5. *New York*.—Binghamton and Lebanon Springs, trace. *North Dakota*.—Woodbridge, 2. *Pennsylvania*.—Girardville, trace. *Rhode Island*.—Lonsdale, trace. *Utah*.—Koosharem, 1.2.

The first snow of the season was reported as follows: 2d, Rico, Colo. 6th, Belmont, Nev. 7th, on mountains near Susanville, Cal.; Downeyville, Nev. 8th, on mountains near Monitors Ranch, Nev. 11th, Virginia City, Nev. 12th, Martin, Idaho; Elk Park, Mont. 17th, Havre (near), Helena, and Fort Logan, Mont.; on hills near Spokane, Wash. 20th, Bonanza City and Lake, Idaho; Havre and Horr, Mont.; Stofiel, Nev. 21st, Hogan, Mont. 23d, Dickinson, Larimore, and Woodbridge, N. Dak. 24th, Leech Lake, Moorhead, Pockagama Falls, Rock Rapids, and Saint Vincent, Minn.; Miles City, Mont.; Bismarck, Churchs Ferry, Dunseith, Gallatin, Joslyn, Minto, Saint John, and Wild Rice, N. Dak.

25th, Marquette, Mich. 27th, Boon, Mich. 29th, Glenwood Springs and Pagoda (near), Colo.; American Falls, Idaho; Virginia City, Mont.; Tuscarora, Nev.; Binghamton and Lebanon Springs, N. Y.; Girardville, Pa.; Lonsdale, R. I. 30th, Breckenridge, Climax, Como, Gold Hill, Greeley, Lavender, Montrose, Moraine, Smoky Hill Mine, Steamboat Spring, Sunnyside, Table Rock, and Ward District, Colo.; on hills near New Hartford, Conn.; Idaho Falls, Idaho; Boulder, Mont.; Belleville, Ely, and Monitors Ranch, Nev.; Chama

and Monero, N. Mex.; Koosharem, Salt Lake City, and Thisle, Utah; Lander, Wyo.

DEPTH OF SNOW ON THE GROUND AT THE CLOSE OF MONTH.

At the close of the month the snow on the ground measured 5.5 at Lavender, Colo.; 4 at Pagoda (near), Colo.; 3 at Steamboat Spring and Sunnyside, Colo.; 1.2 at Pikes Peak, Colo.; 1 at Montrose, Colo.; 0.5 at Soldiers Summit, Nev.; and trace at Glenwood Springs, Colo.

HAIL.

Description of the more severe hailstorms reported for the month is given under "Local storms."

Hail was reported as follows: 1st, Arizona. 2d, Nevada. 3d, Arkansas, California, and New Mexico. 4th, Nevada. 5th, Arkansas, California, Nevada, Ohio, Pennsylvania, Texas, and Vermont. 6th, Nevada, Oregon, and Wisconsin. 7th, Connecticut, Massachusetts, Nevada, New Hampshire, New Jersey, New York, and Pennsylvania. 8th, Minnesota, Missouri, New York, Oregon, and Washington. 9th, Arizona. 10th, Illinois, North Carolina, and North Dakota. 11th, Nevada and Washington. 13th, Alabama, Indian Territory, Michigan, Minnesota, Nevada, and North Dakota. 14th, Minnesota and North Dakota.

15th, New Jersey, New York, Pennsylvania, Virginia, West Virginia, and Wisconsin. 16th, Maryland and New York. 17th, New York. 18th, Minnesota, New York, and Wisconsin. 19th, Oregon, Pennsylvania, and Washington. 20th, Maine, South Dakota, and Washington. 21st, Iowa, Nebraska, Washington, and Wisconsin. 22d, Kansas. 23d, Michigan. 24th, Michigan and Texas. 25th, Delaware, Maryland, Michigan, and Virginia. 26th, Colorado, Connecticut, Nebraska, Ohio, and Texas. 27th, Arizona, Colorado, New Mexico, and Ohio. 28th, Arizona. 29th, Connecticut, Massachusetts, Nevada, New York, and Oregon. 30th, Arkansas and Nevada.

SLEET.

Sleet was reported as follows: 1st, Utah; 13th, Nevada; 21st, Montana; 26th, Texas; 27th, Michigan; 29th, New York and Utah; 30th, Colorado.

WINDS.

The prevailing winds in September 1893, namely, those that were recorded the most frequently, are shown on Chart II by arrows flying with the wind. Southeast to southwest winds have prevailed in the middle and south Atlantic states, the Southwest, the Mississippi and lower Missouri valleys. Northerly winds have prevailed from Manitoba to Alberta, and southward over Montana and Dakota. Southwesterly winds have prevailed in southern California. Variable winds in the lower lake region.

HIGH WINDS.

(In miles per hour.)

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows:

7th, 64, se., at Fort Canby, Wash.; 58, s., at Woods Holl, Mass.; 50, nw., at Havre, Mont. 8th, 60, se., at Fort Canby, Wash. 11th, 59, sw., at Keeler, Cal. 15th, 52, sw., at Green Bay, Wis. 20th, 84, w., at Pikes Peak, Colo. 21st, 61, s., at Marquette, Mich. 23d, 55, se., at Chicago, Ill. 29th, 60, se., at Chicago, Ill. 30th, 56, se., at Chicago, Ill.

LOCAL STORMS.

(75th meridian time is used at regular Weather Bureau stations.)

2d.—During a heavy thunderstorm at Belmont, Nev., 2 horses were killed and one person was badly injured. Heavy rain fell in San Bernardino and Riverside counties, Cal., in

the early morning. At Riverside the storm was accompanied by thunder, lightning, and heavy hail; a house was struck by lightning and inmates stunned; one of the irrigating canals broke, causing damage by flood.

5th.—A thunderstorm passed north of Tiffin, Ohio, in the evening; a barn was struck by lightning and burned.

6th.—A severe windstorm was reported at Oakley, Idaho. During a heavy thunderstorm near Monitors Ranch, Nev., 2 horses were killed by lightning. Sonoma, Cal., was visited by a heavy thunder and rain storm in the morning.

7th.—Heavy thunderstorms prevailed over New England and the middle Atlantic states, and destructive local storms prevailed over southeastern Louisiana. At Boston, Mass., the wind reached a maximum velocity of 44 miles per hour at 8 p. m. Only slight damage was done in Boston, but in the surrounding towns the storm was very severe and great damage was done. At Providence, R. I., the wind squall lasted but 10 minutes, but more damage was done than by any of the severe storms of August.

At Rockland, Me., the storm was very heavy, and much damage was done by lightning. At 3 p. m. a severe storm broke over Friendship, N. Y.; the clouds had a rapid whirling motion and moved southwest. At 3.15 p. m. rain and hail fell in torrents; the hailstones were the size of hickory nuts and lasted 20 minutes; much damage was done to crops. At Port Jervis, N. Y., the storm began at 5.39 p. m.; a funnel-

shaped cloud was observed. Several persons were injured and damage was done to property to the extent of \$20,000.

At Gansevoort, N. Y., a man was killed by lightning. In the Chemung Valley, in southern New York, the storm was attended by heavy hail, and the loss to crops is estimated at \$250,000. A violent thunder and rain storm visited the vicinity of Somerville, N. J.; many trees were uprooted and a number of barns were struck by lightning. Probably the most severe storm that ever visited Bradford County, Pa., swept over that portion of the state in the afternoon. Two persons were killed and a number injured; many buildings and nearly all the timber in the storm's path were destroyed, and crops were damaged by the heavy hail.

The violent storms in southeastern Louisiana were attended by heavy rain which began on the 6th and continued until the 8th. At Lockport, La., a destructive storm, with a funnel-shaped cloud and other characteristics of a tornado, moved from southeast to northwest at 9.30 a. m., 7th. A heavy roar was heard, the clouds had a whirling motion, and heavy rain fell after the storm. Five persons were killed, 17 injured, and property was destroyed to the estimated value of \$40,000. At Mobile, Ala., a heavy rainstorm prevailed from the morning of the 7th to 6.50 a. m., 8th. The wind attained a maximum velocity of 36 miles per hour; damage was done by heavy rain. At Pensacola, Fla., rain and easterly gales prevailed during the day.

9th.—Heavy rains prevailed in parts of Virginia. At Stanardsville rain began the morning of the 9th and continued for nearly six days. The storm was not so heavy at this place, but 20 miles north, along the Blue Ridge Mountains, the rainfall was exceptionally heavy; 3 children and some stock were drowned, and houses and crops damaged. A severe windstorm passed through Bullock County, Ga., in the morning; considerable damage was done to property. A thunderstorm prevailed at Cairo, Ill., in the evening.

10th.—The most severe thunderstorm of the season passed over Worthington, Ind., in the evening; in the vicinity 2 horses were killed by lightning. At Eureka, Cal., rain began at 8.25 a. m. and continued until 9.37 p. m., 11th; considerable damage was done to grain.

11th.—Heavy rains occurred in parts of North Carolina from the 11th to 13th. Streams overflowed and corn on lowlands was damaged. During a thunderstorm in the northern part of Carroll County, Ky., a barn was struck by lightning. At Cairo, Ill., a thunderstorm occurred in the afternoon; damage was caused to electric wires. During a thunderstorm at Red Bluff, Cal., damage was done to grain.

13th.—A severe thunderstorm, with heavy rain, damaged cotton and corn about Hollands Store, S. C. A heavy hailstorm visited the vicinity of Ada and Long Prairie, Minn.

15th.—Heavy rainstorms occurred in southern New York, a hailstorm in West Virginia, and heavy rain and severe gales prevailed over the Great Lakes. A most disastrous rainstorm visited Broome County, New York, in the morning. Rivers and streams overflowed their banks and considerable damage

was done. The greatest damage occurred at Rossville, a suburb of Binghamton, where 4 houses and a number of barns were destroyed. A fierce gale swept over the Great Lakes on the 15–16th; a number of vessels were wrecked. At Sault Ste. Marie, Mich., the wind attained a maximum velocity of 40 miles per hour on the 16th. At 6.30 a. m., 16th, the Saint Marys River rose higher than ever before, and covered the flood-gate of the canal. At Alpena, Mich., the gale began at 9.15 a. m. and ended at 7.10 p. m., 16th, the wind reaching a maximum velocity of 38 miles per hour. At Middle Island, Lake Huron, a velocity of 55 miles was recorded.

18th.—Heavy thunderstorms prevailed in Minnesota. Five miles southeast of Saint Paul 2 men were killed by lightning.

20th.—During a heavy thunderstorm at Mason City, Iowa, in the afternoon, a man was killed by lightning. A very heavy rainstorm occurred at Fort Stanton, N. Mex., in the afternoon.

21st.—Severe gales prevailed over Lakes Huron and Michigan, and heavy thunder and windstorms in the upper Mississippi valley. At Marquette, Mich., a severe gale began at 6 a. m., the wind attained a maximum velocity of 61 miles per hour at 9.50 a. m., the highest wind velocity on record at this station. A heavy thunder and rain storm occurred at Chicago, Ill., in the evening. At the Columbian Exposition Grounds the wind attained an extreme velocity of 60 miles, and much damage was done. A severe local storm visited Madison, Wis., in the evening. A thunderstorm prevailed at Dubuque, Iowa, in the evening. At Latners, about 12 miles west of Dubuque, the path of the storm was nearly 8 miles long and one-half mile wide. A number of persons were injured. A heavy storm unroofed buildings at Pauline, Kans.

22d.—A severe storm, moving east, passed one mile south of Independence, Kans., injuring one person and destroying several buildings. During a thunderstorm 5 miles west of Omaha, Nebr., a barn was struck by lightning.

23d.—Severe storms were reported in southern Ohio. At Wellston, Ohio, 4 persons were injured, and the estimated damage to property was placed at \$10,000. Near Mason, Ohio, a man was killed by lightning. At Hale City, Tex., a thunderstorm began at 7 p. m.; a house was struck by lightning.

25th.—Damage was caused by heavy hail and wind storms in eastern Virginia. A report from Detroit, Mich., states that during a gale on Lake Erie a schooner was driven ashore on Kellys Island and badly damaged. During a heavy thunderstorm at Benton, Mo., a barn was struck by lightning.

27–28th.—Thunderstorms and heavy rain prevailed in south-central Arizona and New Mexico.

29th.—A heavy thunder and hail storm visited Greenport, N. Y., in the morning; damage was done by hail. A severe southeast gale prevailed over Lake Michigan from noon and continued during the 30th; a number of vessels were wrecked. A heavy thunderstorm, with high wind, occurred at Winnview, Okla.

INLAND NAVIGATION.

FLOODS.

On the 2d the Savannah River continued to rise all day, reaching the height of 24.5 feet. Crops in the lowlands were badly injured. From the 9th to the 18th disastrous rains, the heaviest known in that section in 70 years, were reported in Greene County, Virginia. The loss in crops, houses, fences, and stock was estimated to be \$20,000. The drowning of three children was also reported. From the 11th to the 13th heavy rains in North Carolina caused streams to overflow.

Many acres of corn in the lowlands, especially along the Roanoke and Catawba rivers, were damaged. On the 13th the French Broad River reached the height of 8 feet, the highest ever known at this season of the year. At Holbrook, Ariz., from the 28th to the 30th, the Little Colorado River overflowed its banks, and railroads were washed out.

CLOSING OF NAVIGATION.

On the 27th at Chattanooga, Tenn., navigation for large boats was closed on the Tennessee River. At Shreveport, on